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A NEW SPINY MUSSEL, *ELLIPTIO (CANTHYRIA)* *STEINSTANSANA* (BIVALVIA: UNIONIDAE), FROM THE TAR RIVER, NORTH CAROLINA

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The existence of an undescribed spiny mussel from the Carolinas was postulated by Morrison (1955) apparently on the basis of a small specimen from the Isaac Lea collection labeled, North Carolina. This specimen USNM 84376 was figured by Boss and Clench (1967: pl. 15, figs. 2, 3) who appear to have correctly recognized it as *Unio collinus* Conrad 1836 (plate 40, fig. 1) which is found only in the James River system, Virginia. They indicated its conchological and anatomical similarity to *Pleurobema masoni* (Conrad 1834) (plate 40, fig. 2) and placed it in that genus. Fuller (1971) placed *masoni* in the genus *Fusconaia* on the basis of its being tetragenous. Later (1972), he suggested that *masoni* should not be confused with the conchologically very similar *Unio subplenus* Conrad 1837, also from the James River system, and the type species of *Lexingtonia* Ortmann 1914, but he did not attempt a corrected synonymy of the two species, if indeed there are two, which were considered as one by Johnson (1970:301). Fuller (1974), in more detail, discussed the close relationship of *Fusconaia masoni* and the genus *Lexingtonia* but did not mention any species of the latter. Davis and Fuller (1981:218) again

¹The order of authorship was determined by the flip of a coin.

pointed out that, "*masoni* is tetragenous and thus belongs to *Fusconaia*. Except for the one character-state difference, one finds little difference between *F. masoni* and various species of *Elliptio* and *Pleurobema*." The two species from the James River system appear to be of similar lineage, Boss and Clench (1967) indicated that when *collina* does not have spines it could be confused with *masoni* except that the latter was slightly more rhomboid, often with a brownish clothlike periostracum, generally with at least a trace of green rays on the disk, whereas *collina* has a periostracum that is more yellowish and smooth, with only an occasional hint of brownish rays. Thus, Boss and Clench (1967) and Johnson (1970: 301,303) did not follow Frierson (1927: 46) who placed *U. collinus* and *U. spinosus* Lea 1836 in the genus *Canthyria* Swainson 1840 on the basis of the spines alone, or Morrison (1955) who regarded both as species of *Elliptio* in the subgenus *Canthyria*. Starobogatov (1970: 69) and Fuller (1977: 158) elevated *Canthyria* to generic status without discussion. Ortmann (1912: 269) suggested that the spines on *U. spinosus* were unique, and would possibly justify the erection of a separate genus, *Canthyria* for that species. Simpson (1914: 704) stated that the anatomy of *spinosa* was typical of *Unio* [= *Elliptio*]. Since *Canthyria* is distinguished from *Elliptio* Rafinesque only by the presence of spines we continue to retain it as a subgenus of *Elliptio*.

Morrison was correct in his assumption that a third spiny mussel existed in the Carolinas. It was discovered by Carol B. Stein, of the Ohio State Museum of Natural History, in 1964. The tiny specimens were misidentified by Johnson (1970:301) who regarded them as a range extension of *Pleurobema (Lexingtonia) collina* which occurs only in the James River system.

Since the discovery of the undescribed Tar River spiny mussel, a number of specimens have been collected by H. D. Athearn, R. G. Biggins, A. H. and J. M. Clarke, W. H. Harmon, D. H. Stansbery, and others. Those specimens subsequently seen by the authors have convinced them as to both

their uniqueness and close relationship to *Elliptio* (*Canthyria*) *spinosa* (plate 40, fig. 3) of the Altamaha River system. Johnson, as first revisor of the Atlantic Slope unionids (1970), had long planned to describe this species, but was prevented from doing so because few examples of it were at his disposal. Clarke has recently completed an extensive status survey of the Tar River spiny mussel for the U.S. Fish and Wildlife Service, (Contract no. 14-16-0004-82-014) to whom he is grateful for having been chosen for performing such a pleasant task, which added to the number of specimens available for study. The authors are pleased to name this species for Dr. Carol B. Stein who discovered it and her colleague, Dr. David H. Stansbery, one of whose specimens was figured by Shelley (1972). Thanks are extended to Dr. Kenneth J. Boss for suggesting the name and for preparing some of the photographs.

Abbreviations

MCZ—Museum of Comparative Zoology, Cambridge, Massachusetts
 USNM—National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Elliptio (*Canthyria*) *steinstansana* new species

Plate 40, figs. 4, 5

[spiny naiad] Shelley, 1972. *Wildlife in North Carolina* 36: 4, fig.

"*Canthyria*" sp. Fuller, 1977. *Endangered and Threatened plants and animals of North Carolina*, p. 158.

Holotype: MCZ 282677, from the Tar River, 1.5 mi. N of Tarboro, Edgecombe County, North Carolina.

Paratypes: All of the specimens listed under: Specimens Examined are paratypes.

Measurements

| Length | Height | Width | (excluding spines) |
|--------|--------|-------|--------------------------|
| mm | mm | mm | |
| 62.0 | 38.6 | 27.3 | (1) Paratype MCZ 282678 |
| 56.1 | 35.1 | 19.2 | (2) Paratype USNM 758667 |
| 54.0 | 33.0 | 23.8 | (3) Holotype MCZ 282677 |
| 32.7 | 20.8 | 13.6 | (4) Paratype MCZ 282676 |

(1) no spines

(2) one spine on each valve

(3) one spine on right valve only

(4) one spine on left valve, 3 spines on right valve

Description. Shell medium, reaching about 60 mm. in length. Outline subrhomboidal, valves subinflated, inequilateral; shell solid. Anterior end regularly rounded; posterior end slightly broader, ending in a blunt point just below the medial line. Ventral margin slightly curved. Dorsal margin obliquely descending from the umbos, imperceptibly joining the descending posterior margin. Hinge ligament prominent, but short. Posterior ridge generally slightly angular, sometimes with a faint secondary ridge above it, posterior slope smooth. Umbos slightly elevated above the hinge line, located in the anterior third of the shell, their sculpture consisting of about three short, strong bars. The first one or two bars are oblique and extend diagonally across the growth lines (the posterior ends are closer to the hinge) and the later bars are slightly curved and nearly parallel with the growth lines. Surface of the shell generally smooth and shiny with fine concentric sculpture. Each valve usually ornamented with from one to several short spines. Specimens less than 35 mm. in length usually have two or three erect spines on each valve. They are about 2.6 mm. in length and 1.5 mm. wide at their bases. They project perpendicularly from the shell surface, the tips are slightly bent in a ventral direction, and are generally arranged in a radial row located slightly in front of the posterior ridge.

Periostracum orange-brown and covered with narrow and wide greenish rays when young, becoming darker or blackish-brown, with the rays inconspicuous when adult.

Left valve with two pseudocardial teeth, one in front of the other, both somewhat triangular, the hinder one smaller. Hinge line short and narrow, two straight, elevated, compressed, obliquely descending lateral teeth. Right valve with two roughly parallel pseudocardinals, the posterior one triangular and serrate, the more anterior one low and quite vestigial; one lateral tooth. A thick, low, interdental projection in the right valve articulates with a shallow cavity in the left one. Beak cavities rather shallow with a few dorsal muscle scars. Anterior adductor muscle scars well impressed, posterior ones faint. Pallial line impressed anteriorly where the shell is thicker, faint posteriorly. The nacre is yellowish or pinkish anteriorly, but bluish white and iridescent posteriorly.

Anatomy. "The foot is white. The mantle is also generally white but shading anteriorly to pale orange-brown, translucent, and with a narrow band of brown pigment around the branchial opening. The branchial opening is 9.0 mm. long and bordered at the edge, on each side, by a single row of about 12 simple, flattened papillae, each about 2.5 mm. long. Branchial and anal openings apparently separated only by the diaphragm. Anal opening 6.2 mm. long and bordered within and below the edge, on each side, by a single row of about 7 flattened papillae, each about 1.5 mm. long. Mantle connection between anal and supra-anal opening 2.8 mm. long. Supra-anal opening slit-like, with expanded edges, and 10.0 mm. long. Demibranchs pale orange-brown, the inner demibranchs projecting well beyond the outer demibranchs anteriorly and ventrally. Outer demibranch with about 2.0–2.5 water tubes per mm, and inner demibranch entirely unconnected to the visceral mass posteriorly but attached anteriorly. Labial palps with straight margins above, rounded margins below, and broadly overlapping the inner demibranchs. Based on MCZ 282678 which was frozen in water in a natural position, thawed,

fixed in 10% formalin and preserved (and perhaps bleached) in 70% ethyl alcohol. A living, immature paratype USNM 758545 had its branchial opening surrounded by about 30 large and small, gray, white-tipped papillae and its anal opening surrounded by about 12 small, gray, white-tipped papillae. The supra-anal opening was about as long as the branchial and anal openings combined. The foot and mantle edges were pale yellow. In another live specimen, returned to the river, the foot and mantle edges were pale orange (Clarke)."

Breeding season. Not known.

Habitat. "Has been collected on sand and mud bottoms in shallow water, but its presence in muskrat middens (M.J. Imlay, pers. comm.) suggests that it also occurs in deeper water (Fuller, 1977: 158)."

Plate 40

Fig. 1. *Fusconaia collina* (Conrad). James River, Virginia. MCZ 226656. Length 44, height 26, width 13 (less spines) mm. (slightly enlarged).

Fig. 2. *Fusconaia masoni* (Conrad). Tar River, 9 mi. NW of Greenville, Pitt Co., North Carolina. MCZ 250578. Length 38, height 26, width 17 mm. (slightly enlarged).

Fig. 3. *Elliptio (Canthyria) spinosa* (Lea). Altamaha River, 4 mi. NE of Jesup, Wayne Co., Georgia. MCZ 234055. Length 59, height 37, width 22 mm. (approximately 1.2 \times).

Fig. 4. *Elliptio (Canthyria) steinstansana* new species. Tar River, 1.5 mi. N of Tarboro, Edgecombe Co., North Carolina. Holotype MCZ 282677. Length 54, height 33, width 23.8 mm. (nat. size).

Fig. 5. *Elliptio (Canthyria) steinstansana* new species. Tar River, above River Front Park, Tarboro, Edgecombe Co., North Carolina. Paratype MCZ 282676. Length 32.7, height 20.8, width 13.6. (slightly enlarged).

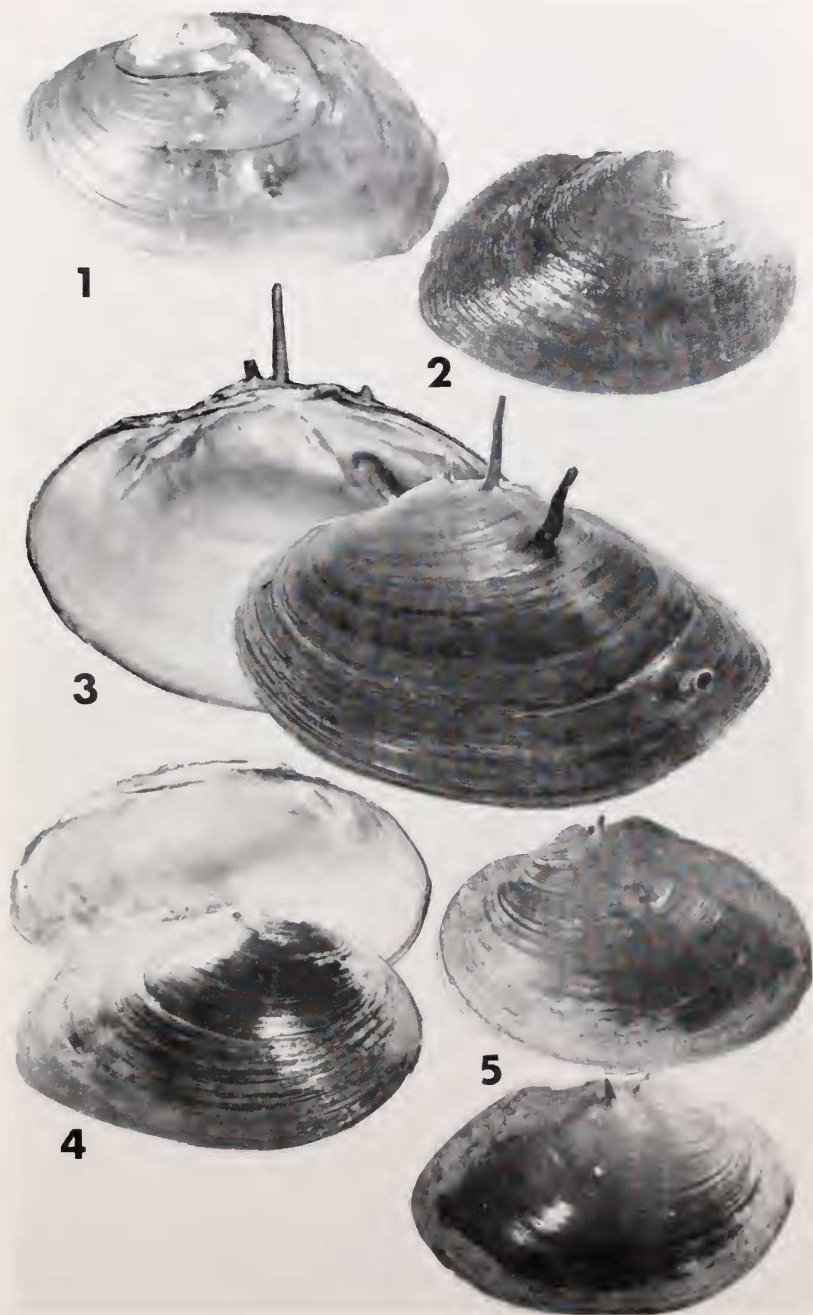


Plate 40

Remarks. Only three species of unionids in the world have spines on their post-larval shells. All of them occur in the Southern Atlantic Slope region. The relationship between *Fusconaia (Lexingtonia) collina* Conrad and *F. (L.) masoni* Conrad of the James River system has been discussed. On the basis of shell morphology, *E. (C.) steinstansana* is more similar to *E. (C.) spinosa* (Lea 1834) (Johnson, 1970: 303, pl. 2, fig. 11) from the Altamaha River system, Georgia than any other species. Specimens of *spinosa* exceed 90 mm. in length whereas those of *steinstansana* are not known to exceed 90 mm. The shall of *spinosa* is proportionately higher, the posterior margin is more pointed, and the posterior ridge is much sharper than in *steinstansana*. The spines in *spinosa* are proportionately much longer and are curved dorsally rather than ventrally, and the umbonal sculpturing in *spinosa* is finer. The periostracum of *spinosa* is greenish yellow or brownish in old shells, usually with faint greenish and yellowish rays, whereas that of *steinstansana* is orange brown and covered with narrow and wide greenish rays when young becoming darker or blackish brown, with the rays inconspicuous when adult. An interdental projection is virtually wanting in *spinosa* but is well developed in *steinstansana*. The nacre in *spinosa* is predominantly purple whereas in *steinstansana* the nacre is yellowish or pinkish anteriorly, where the shell is thickened, but bluish white and iridescent posteriorly.

The anatomy of the two species is similar, but in *steinstansana* the water tubes in the female, not gravid, outer demi-branchs extend completely to the ventral margin, but in *spinosa* they do not. The pigmentation of the mantle openings in the latter is more intense.

Range. Southern Atlantic Slope: Tar River, between Nash and Pitt Counties, of the Pamlico River system.

Specimens Examined

PAMLICO RIVER SYSTEM

TAR RIVER DRAINAGE—*North Carolina*: Tar River, 2 mi. W Spring Hope, Nash Co. (W. N. Harman, Sept. 1968, paratype MCZ 267438); Tar River, 1.5 mi. N Tarboro (A. H. Clarke and R. G. Biggins Sept. 1982, Holotype MCZ 282677, paratype MCZ 282678); above River Front Park, Tarboro (A. H. Clarke and R. G. Biggins, August 1982, paratype MCZ 282676); [muskrat midden] Riverside Park, Tarboro (R. G. Biggins, August 1982, paratype MCZ 282784); Old Sparta (C. B. Stein, 1964, 2 paratypes Ohio State Museum; and A. H. and J. M. Clarke, paratypes USNM 758667 and MCZ 282678); *all* Edgecombe Co. Tar River, 1.4 mi. E Falkland, Pitt Co. (H. D. Athearn, ca. 1970, paratype MCZ 293570).

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